

**ABSTRACT**

Inventive silsesquioxane polymers are provided, and resist compositions that contain such silsesquioxane polymers are provided in which at least a portion of the silsesquioxane polymer contains fluorinated moieties, and at least a portion of the silsesquioxane polymer contains pendant solubility inhibiting acid-labile moieties that have low activation energy for acid-catalyzed cleaving, and the presence of high optical density moieties are minimized or avoided. The inventive polymer also contains pendant polar moieties that promote alkaline solubility of the resist in aqueous alkaline solutions. The inventive polymers are particularly useful in positive resist compositions. The invention encompasses methods of using such resist compositions in forming a patterned structure on a substrate, and particularly multilayer (e.g. bilayer) photolithographic methods, which methods are capable of producing high resolution images at wavelengths such as 193nm and 157nm.